Site: Soybean	**Overall Confidence Rating: High**

Background: A total of 70,850,000 acres are planted in soybeans in the United states. Production is limited to the Eastern and Central U.S. with Northern acres accounting for 75.5% of total production. Top soybean production states are Illinois and Indiana. Organophosphate pesticides (OP) represent 42% of all pesticide usage on this crop with an average of 1.1 applications per year. Analysis of OP usage was conducted for two regions; Northern U.S. (IL, IN, IA, KS, KY, MI, MN, MO, NE, NJ, ND, OH, PA, SD, and WI) and Southern U.S. (AL, AR, De, FL, GA, LA, MD, MS, NC, OK, SC, TN, TX, and VA). Insecticide use patterns and key pests vary between regions largely as a result of the inability of some insects to overwinter in the northern U.S. Typically only 2.5% of all soybean acreage is treated annually with insecticides.

Organophosphate	% Treated		# Applications		Rate (lb AI/A)		PHI (days)	
Pesticides	Max[10]	Avg[10]	Max[8]	Avg[10]	Max[8]	Avg[10]	Min[8]	Avg[2]
acephate	< 1	0	NS	---	0.99	0.5	14	---
azinphos-methyl	< 1	0	NS	---	0.75	---	45	---
chlorpyrifos	3	<1	NS	1	3.33	0.7	28	---
diazinon	---	---	NS	---	4.00	---	---	---
dimethoate	1	<1	NS	---	0.5	---	21	---
disulfoton	< 1	0	NS	1	1.01	2	75	---
malathion	< 1	0	NS	1	2.0	0.3	7	---
methyl parathion	<1	0.1	2	---	1.02	---	30	---
phorate	<1	0	NS	---	4.9	---	---	---

Confidence Rating: H= high confidence = data from several confirming sources; confirmed by personal experience
M = medium confidence = data from only a few sources; may be some conflicting or unconfirmed info.
L = low confidence = data from only one unconfirmed source

Organophosphate Target Pests for Soybean in Northern U.S. (Primary pests controlled by the OP's)[2, 3, 4, 5]	
Major	Bean leaf beetle, Leafhopper (Potato and Three-cornered Alfalfa), Grasshopper
Moderate	Thrips
Minor	Cutworms

Major = 20+% of all OP usage on pest; Moderate = 5-20% of all OP usage on pest; Minor =<5% of all OP usage on pest

Organophosphate Target Pests for Soybean in the Southern U.S. (Primary pests controlled by the OP's[2, 6, 7]	
Major	Stink Bug,
Moderate	Looper (Cabbage, Alfalfa, and Soybean), Corn Ear Worm/Bud Worm
Minor	Armyworm (Beet), Grasshopper

Major = 20+% of all OP usage on pest; Moderate = 5-20% of all OP usage on pest; Minor =<5% of all OP usage on pest

Sources:

1. Proprietary EPA market share information 1994-1996.
2. QUA+ - Indiana, Illinois, Georgia, Florida, Louisiana. 1997.
3. Field Crop Insects - Soybean Insect Control Recommendations. 1997. Purdue University Cooperative Extension Service. E-77.
4. 1995 Insect Pest Management Guide for Iowa Field and Forage Crops. 1995. Iowa State University Extension. IC-474.
5. Insect and Disease Management-Field Crops, Forages and Livestock. 1996. University of Missouri-Columbia, University Extension. M 160.
6. Soybean Insect Management. 1996. Mississippi State University - Cooperative Extension Service. Publication 883.
7. 1998 Insecticide Recommendations for Arkansas. 1998. University of Arkansas - Cooperative Extension Service. MP 144.
8. Label Use Information System (LUIS) Version 5.0, EPA.
9. The All-Crop, Quick Reference Insect Control Guide (1997), Meister Publishing Company
10. EPA Internal QUA Data.

Date: 8/26/98

Site: Soybean
Region: Northern (IL, IN, IA, KS, KY, MI, MN, MO, NE, NJ, ND, OH, PA, SD, and WI)

Pest[2, 3, 4, 5]	Organophosphate[1, 2, 3, 4, 5, 6, 7]	Efficacy	Mkt[1]	Class	Alt. Pesticide List[1, 2, 3, 4, 5, 6, 7]	Efficacy	Mkt[1]	Constraints of Alternatives[2]
Timing: Post-Emergence								
Bean Leaf Beetle (Major)	acephate	---	---	C	carbaryl	---	High	
	chlorpyrifos	---	High	C	methomyl	---	---	
	dimethoate	---	Lo	C	thiodicarb	---	---	
	methyl parathion	---	Lo	P	esfenvalerate	---	Lo	
				P	lambda-cyhalothrin	---	---	
				P	permethrin	---	Lo	
Leafhopper (Potato and Three-cornered Alfalfa) (Major)	acephate	---	Lo	C	carbaryl	---	Lo	
	chlorpyrifos	---	High	C	carbofuran	---	Lo	
	dimethoate	---	High	P	esfenvalerate	---	Lo	
	malathion	---	Lo	P	lambda-cyhalothrin	---	---	
				P	permethrin	---	Med	
Grasshopper (Major)	acephate	---	Lo	C	carbaryl	---	High	
	chlorpyrifos	---	High	C	carbofuran	---	Med	
	dimethoate	---	Lo	P	esfenvalerate	---	Lo	
	disulfoton	---	Lo	P	lambda-cyhalothrin	---	Med	
	malathion	---	High	P	permethrin	---	Lo	
	methyl parathion	---	Lo	P	tralomethrin	---	Lo	

Pest Importance: Major = 20+% of all OP usage on pest; Moderate = 5-20% of all OP usage on pest; Minor = <5% of all OP usage on pest
Efficacy Rating: Excellent = ☺ Good = ❍ Fair = ●
Market Share: High = use of OP represents 20+% of all insecticide usage on pest; Med = 5-20% of all usage on pest; Lo = <5% of all usage on pest
Insecticides: C = Carbamates; P = Pyrethroids; CH = Chlorinated Hydrocarbons; IGR = Insect Growth Regulators; B = Biological; O = Other pesticides

Site: Soybean
Region: Northern (IL, IN, IA, KS, KY, MI, MN, MO, NE, NJ, ND, OH, PA, SD, and WI)

Pest[2, 3, 4, 5]	Organophosphate[1, 2, 3, 4, 5, 6, 7]	Efficacy	Mkt[1]	Class	Alt. Pesticide List[1, 2, 3, 4, 5, 6, 7]	Efficacy	Mkt[1]	Constraints of Alternatives[2]
Timing: Post-Emergence								
Thrips	acephate	---	High	C	carbaryl	---	---	
(Moderate)	methyl parathion	---	---	P	lambda-cyhalothrin	---	---	
Cutworms	acephate	---	Lo	C	thiodicarb	---	---	
(Minor)	chlorpyrifos	---	Lo	P	cyfluthrin	---	Lo	
				P	esfenvalerate	---	High	
				P	lambda-cyhalothrin	---	Lo	
				P	permethrin	---	Lo	

ADDITIONAL INFORMATION:[2]

Most insect pest of soybean in the Northern U.S. are attacked by natural enemies or biological control agents that usually help to keep pest populations well below economic injury levels. In addition to the pests listed above, Two-spotted spider mite populations may explode during prolonged hot and dry conditions. Feeding damage by this pest is irreversible and may result in the death of several or all of the leaves on a plant. In addition, once leaves become discolored as a result of mite feeding activity, they no longer contribute to yield potential. It is estimated that failure to chemically control the sporadic but severe outbreaks of this pest can reduce yields by 8 bushels per acre (one-third of expected yield).

SOURCES:

1. Proprietary EPA market share information 1994-1996.
2. QUA+ - Illinois and Indiana. 1997.
3. 1995 Insect Pest Management Guide for Iowa Field and Forage Crops. 1995. Iowa State University, University Extension. IC-474.
4. Field Crop Insects - Soybean Insect Control Recommendations - 1997. 1997. Purdue University Cooperative Extension Service. E-77.
5. Insect and Disease Management-Field Crops, Forages and Livestock. 1996. University of Missouri-Columbia, University Extension. M 160.
6. The All-Crop, Quick Reference Insect Control Guide (1997), Meister Publishing Company.
7. Label Use Information System (LUIS) Version 5.0, EPA.

Date: 08/24/98